



Material on the purchase of recording equipment

In deciding what equipment to include in our recommendation for purchase, we started out by assessing our equipment needs based on the purposes of the purchase as outlined in the formal motion. We then moved on to assess what equipment is already available to UF in order to evaluate the compatibility of any new equipment with pre-existing materials. In our assessment we concluded that the equipment purchased should:

- Be easy to use and beginner friendly, so as to make sure that as many people as possible within UF have access to recording capabilities;
- Be flexible in its areas of use, so as to fit a range of different recording needs within UF, ranging from podcasts, to field work, to promotional videos;
- Be suitable for both inside and outside recording to allow for members to take their recording and creation to the streets. This decision is informed both by limited ability for UF to operate indoors given covid-19-restriction, as well as a desire for UF groups to be able to do more field work;
- Allow for the recording of multiple audio sources at the same time, whether it be an audio recording with more than one person in a podcast-scenario, recording Q&A sessions during a lecture, or to record at two different locations at the same time.

Furthermore, when researching the camera that UF owns – a Sony A6000 – we also concluded that this camera model does in fact not possess a functional microphone input, making it necessary to purchase an external recording device. However, we do not consider this to be an issue: most high-quality recording is best done through the use of a powerful external recorder, as most cameras have less capacities for sophisticated audio processing.

With this in mind, we concluded that an equipment purchase by UF should include:

- At least two microphones for recording two different audio sources at once
- A handheld field-recorder
- A microphone mount for outdoor use
- Two microphone mounts for indoor use
- Two microphone shock mounts
- A microphone windscreen
- A camera stand
- Cables of varying lengths for inside and outside use
- A 32GB SD card for storage



- A pair of headphones

In selecting the specific model and brand of each piece of equipment we consulted several online resources, as well as gathering personal recommendations from acquaintances with relevant knowledge of audio recording (a list of resources is provided at the end of this document). Below follows a summary of our research and resulting purchasing recommendations.

I. Microphones

Pickup pattern:

A pickup pattern describes the way in which the microphone captures sounds. Generally, microphones have one of three distinct pickup patterns – **omnidirectional**, **cardioid** and **shotgun**:

Omnidirectional microphones capture sound from all directions equally. Whether the sound source is behind, in front of, or beside the mic, it's all the same. Omnidirectional mics are good at handling windy weather conditions, but they will pick up on sounds all around its proximity, making the primary audio source, such as a person being interviewed, constantly compete with surrounding audio. For that reason, these mics require close proximity to the primary source.

Shotgun microphones narrowly focuses on whatever is directly in front of it and have a long reach, meaning they can record sound both up close and at a distance, rejecting sounds from the sides and the rear. These mics are often used for field recordings where you cannot always get so close to your primary audio source, but they are also commonly used for studio and theatre recordings, especially in the recordings of voiceovers and ads. A potential disadvantage of the shotgun microphone is that it is not of good use when wanting to pick up more ambient sounds in your recording environment. Since they don't need to be as close to the primary audio source, they can often be kept out of frame in video content if necessary.

Cardioid mics have an upside-down heart-shaped pickup pattern – they capture mostly from the front, not so well from the sides, and reject sound at the rear. These types of microphones are often used for handheld, back-and-forth interviewing, and they do a good job of cancelling out disturbances in the sound due to impact shocks. However, the cardioid mics lack the specific advantages of omnidirectional and shotgun mics.



Operating principle:

The operating principle describes how the microphone picks up sound and converts it into an electrical signal. There are two main categories of operating principles for microphones, namely **dynamic** and **condenser**:

- **Dynamic** microphones are more commonly used when recording more “extreme”, loud sounds, like in a rock club or some outdoors environments. They work well recording booming sounds and powerful vocals. Dynamic mics are generally more durable and not as sensitive. They require no additional power input.
- **Condenser** microphones are commonly used in more controlled environments and generally produce a higher sound quality. Condenser microphones are best used to capture vocals and high frequencies. They are also the preferred type of microphone for most studio applications. The condenser mics are less durable than dynamic mics and need to be handled with more care. They also require something called “phantom power” in order to work, but this additional power is what gives them their great audio output.

Recommendation:

Microphones

Based on this comparison, as well as multiple endorsements from a variety of sources (see end of document), our recommendation is to purchase two condenser **Rode NTGI shotgun microphones**. This is mainly due to their flexibility in both indoor and outdoor use, up close, as well as at a distance. They are not the most common microphone used for studio recordings with a radio or podcast format, but they are very efficient in these recording environments as well, when paired with the appropriate equipment to decrease their sensitivity to impact shocks. Their quality as condenser microphones as opposed to dynamic also increases their suitability for more sensitive audio sources, such as speaking vocals and the like. Based on our research, they seem to be the most flexible and multifunctional, thus serving as a perfect first set of microphones for UF. Additionally, if the need for other types of microphones with different functions would appear in the future there is always the possibility of complementing this purchase at a later time.

XLR Cables

In terms of microphone extras, we recommend purchasing a total of four **XLR Cables**: two **pro snake TPM 1,0** (1 meter), one **pro snake TPM 6** (6 meters) and one **pro snake TPM 10** (10 meters). We think the two shorter cables will be well suited for podcasts and interview-like recordings in studio, whilst the longer cables will function well in more mobile scenarios, such as



outdoor recording and recording lectures, where one cannot position so close to the primary audio source.

Microphone mounts

Given that we want to be able to record long audio segments in many varied settings, we have decided to recommend using microphone mounts instead of holding the microphones in hand, manually. Holding the microphones by hand will get tiresome and painful in longer recording sessions and is, for example, not viable for recording lectures. Since we want to be able to record both inside and outside, we have determined that we are in need of two separate types of mounts, as outdoor mounting solutions and indoor mounting solutions are not always very compatible (most indoor solutions require that the microphone stand is mounted on a completely still surface, commonly a table). For outdoor use we are recommending the **Rode SM3-R shock mount for camera**, which allows for one mic to be attached to the top of any camera with a hot shoe (which the Sony a6000 has). This will steadily direct the front of the microphone to whomever is being recorded by video, making it highly practical for video content, such as interviews, both outdoors and indoors. Secondly we recommend purchasing two **Rode PSA-I**, which are table mounted mic stands used primarily for indoor and studio recordings. The flexibility of the armature allows for easy movement of mics closer and further away from an audio source and also reduces the likelihood of disturbances due to impact shocks, which are more common when using simple table mic stands. We also recommend using additional so-called shock mounts – namely the **Rode SM4 – R** – to further avoid disturbances to the sound. We have chosen to highly recommend the shock mounts for all mounting solutions. In the case of the indoor microphone stands, many of them require the manual connectivity solution of the shock mounts, or a similar mic holder to even attach to the microphone at all, but more importantly, shock mounts are necessary when using more sensitive microphones, such as the Rode NTG1, in order to absorb disturbances from impact shocks (like someone bumping the mic stand or the table). Having shock mounts for all of our mounting solutions will greatly impact the quality of recordings.

Windscreen

Lastly, we have chosen to also include a simple **Rode DeadCat** Windscreen in our recommendation. The windscreen is a cheap way to ensure that the microphone is not disturbed as much by wind when recording outside. Many of our sources highly recommend this addition, some stating that it is impossible to get usable sound recordings without it when using shotgun microphones, which are notoriously more sensitive to wind than some other models.



2. Recorders

The recorder is the processing apparatus of audio input. It is the device that “reads” audio and converts it to a digital format. In choosing a recorder, there are two primary options: **Studio recorders** and **field recorders**. Studio recorders tend to be larger, fairly immobile pieces of equipment with a lot of processing capabilities that are primarily used for indoor, stationary recordings. Field recorders are used in field recordings for their mobility, flexibility and small size, but they are also commonly used for indoors studio-like recording, as they serve the same function regardless. They also tend to have smaller processing power than a lot of studio recorders. Due to their flexibility in use, our recommendation is a handheld field recorder, for its flexibility and multifunctionality, allowing for recording both indoors and outdoors. In choosing the model of field recorder, we have been looking at four different primary functions: **track recording, storage, recording formats, and compatibility and editing software.**

Track recording

When choosing a handheld recorder, the number of tracks you can record determines how many audio sources you can record at once. Recorders will generally have a certain number of XLR-inputs, determining how many microphones you can record from. It is important that any recorder using condenser microphones have capacity for phantom power, as this is needed in order for these mics to function.

Storage

For shorter recordings with less audio tracks, one could get by with recorders that only have an internal storage option. In order to record and store more audio, one needs to have a recorder that allows for external storage, which usually comes in the form of SD memory cards. Some recorders are compatible with SDHC cards that reach up to 32GB of storage.

Recording Formats

The recording format is an important factor in determining the quality of sound recorded. Many of the most popular handheld recorders record at 24-bit/92kHz, and some can record audio at rates of 24-bit/192kHz. Whilst the former is standard for many types of recording, the latter option can be of great use when recording more complex sounds that require a lot of sensitivity, such as complex musical arrangements and the like. The latter option also requires more storage space.

Compatibility and editing software

Another factor to consider is whether the recorder functions as an audio interface. The audio interface is also an important factor in producing high quality sound. It determines the complexity



of the sound you are able to record and helps out with the processing and editing of your recording. With a field recorder that also functions as an audio interface you have to option of processing and mixing your sound right away, either directly or by connecting your recorder straight to your computer and editing software (UF has an Adobe licence, which comes with editing software such as Adobe Audition and Premium for sound and video editing). This also allows for you to adjust the levels of your recording in real time, enabling you to make sure that no audio is lost, distorted or poorly captured.

Recommendation:

Considering the above mentioned factors and the recommendations from numerous sources, we have opted for a **Zoom H6 Black** handheld field recorder with an **32GB SD card** to start off. It has 6 recording tracks (four with external microphones and two with specific extensions for the Zoom device that are not included in the purchase), making sure that we have enough tracks to record with our two microphones, whilst also leaving enough room to grow if we wanted to expand and increase microphone usage to four in the future. This device supports SD/SDHC cards up to 32GB and SDXC cards up to 128 GB, again leaving room for expansion while providing the necessary storage space for longer recordings with several audio tracks. The maximum recording quality is 24 bit / 96 kHz, which is perfectly suitable for the type of audio that UF is expected to record. Lastly, unlike the lower tier Zoom recorders, such as the Zoom H4nPro, this recorder also functions as an audio interface, significantly improving our ability to record high quality sound and gain more real-time control in the recording process to avoid common errors.

As a useful extra for the recorder, we have chosen to recommend purchasing at least one set of headphones, such as **the t.bone HD 200** in order to listen in to your recordings in real time to make sure that the sound is on point. We consider these to be good headphones to start off with and to later upgrade if necessary.

3. Camera stand

For our final purchasing recommendation, we strongly suggest purchasing a camera stand. We have chosen the **Benro Stativkit T880EX Digital aluminium**. This is a cheap option that we think will work perfectly for starting out with video recordings both inside and outside. It will serve to stabilise video recordings, as handheld video cameras always result in a shaky image. This option also has a rotating camera head with a handle, allowing for some camera rotation (to the sides or up and down), which can be useful when filming segments in which you want the camera to follow along with a moving object.



4. Summary of recommended purchase: Option I

Below is a summary of our recommended purchase, which we have labelled **Option I**:

Handheld field recorder:

1x Zoom H6 Black (3 222 kr)

https://www.thomann.de/se/zoom_h6_black.htm

Microphones:

2 x Rode NTG1 shotgun mic (2 111 kr)

https://www.thomann.de/se/rode_ntg_1.htm

SD card for storage:

1x Thomann SD Card 32 Gb Class 10 (125 kr)

https://www.thomann.de/se/thomann_sd_card_32_gb_class_10.htm

XLR Cables:

2 x pro snake TPM 1,0 (52 kr)

https://www.thomann.de/se/pro_snake_tpm_10_02.htm

1 x pro snake TPM 6 (82 kr)

https://www.thomann.de/se/pro_snake_tpm_6.htm

1x pro snake TPM 10 (105 kr)

https://www.thomann.de/se/pro_snake_tpm_10.htm

Microphone mounts:



1 x Rode SM3-R (485 kr) – shock mount for camera

https://www.thomann.de/se/rode_sm3_r.htm

2 x Rode SM4-R (489 kr)

https://www.thomann.de/se/rode_sm4_r.htm

2 x Rode PSA-I (839 kr)

https://www.thomann.de/se/rode_psaI.htm

Windscreen:

Rode DeadCat (369 kr)

https://www.thomann.de/se/rode_deadcat.htm

Headphones:

the t.bone HD 200 (199 kr)

https://www.thomann.de/se/the_t.bone_hd_200.htm

Camera stand:

Benro Stativkit T880EX Digital aluminium (499 kr)

https://www.scandinavianphoto.se/benro/stativkit-t880ex-digital-aluminium-1018894?gclid=CjwKC-AiAo5qABhBdEiwAOtGmbpyMKt2XSV7XAXgUcLOqrVjB9NZGi4CkH2O_DY70Bz_NaEsEwUclnBoCaJUQAvD_BwE

Total amount: 12 068 SEK



We strongly recommend the purchase of all equipment as it is listed in the summary of recommended purchase: Option 1. However, we have also considered a cheaper alternative for purchase based on our research and concluded that we could operate recording without microphone mounts in order to reduce the cost of this equipment package. We could also reduce cost further by not investing in headphones, thus relying on the use of UF members personal headphones for recording. This option, which we will label Option 2, would thus not include the Rode SM3-R – shock mount for camera, the Rode SM4-R, the Rode PSA-1 or the t.bone HD 200.

5. Summary of alternative purchase: Option 2

Below is a summary of the cheaper alternative purchase: **Option 2:**

Handheld field recorder:

1x Zoom H6 Black (3 222 kr)

https://www.thomann.de/se/zoom_h6_black.htm

Microphones:

2 x Rode NTG1 shotgun mic (2 111 kr)

https://www.thomann.de/se/rode_ntg_1.htm

SD card for storage:

1x Thomann SD Card 32 Gb Class 10 (125 kr)

https://www.thomann.de/se/thomann_sd_card_32_gb_class_10.htm

XLR Cables:

2 x pro snake TPM 1,0 (52 kr)



https://www.thomann.de/se/pro_snake_tpm_10_02.htm

1 x pro snake TPM 6 (82 kr)

https://www.thomann.de/se/pro_snake_tpm_6.htm

1x pro snake TPM 10 (105 kr)

https://www.thomann.de/se/pro_snake_tpm_10.htm

Windscreen:

Rode DeadCat (369 kr)

https://www.thomann.de/se/rode_deadcat.htm

Camera stand:

Benro Stativkit T880EX Digital aluminium (499 kr)

https://www.scandinavianphoto.se/benro/stativkit-t880ex-digital-aluminium-1018894?gclid=CjwKC_AiAo5qABhBdEiwAOtGmbpyMKt2XSV7XAXgUcLOqrVjB9NZGi4CkH2O_DY70Bz_NaEsEwUclnBoCaJUQAvD_BwE

Total amount: 8 728 SEK

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6. Sources (in addition to thomann.de and scandinavianphoto.se):

<https://blog.landr.com/microphone-types/>

<https://blog.landr.com/30-best-microphones/>

<https://www.soundguys.com/field-recording-guide-26352/>

<https://www.soundguys.com/field-recording-guide-26352/>

<https://www.creativefieldrecording.com/2016/11/09/community-field-recording-equipment-audio-recorders/>

<https://www.creativefieldrecording.com/2011/03/07/digital-sound-recorder-buying-guide/>

<https://www.creativefieldrecording.com/2016/11/16/community-field-recording-equipment-microphones-and-favourite-kits/>

<https://www.creativefieldrecording.com/2015/11/18/field-recording-gear-buyers-guide/>

<https://ehomerecordingstudio.com/stereo-microphones/>

<https://training.npr.org/2016/06/28/which-mic-should-i-use/>

<https://www.scandinavianphoto.se/sound-devices/702t-portabel-ljudinspelare-med-timecode-1043182>

<https://www.sweetwater.com/insync/handheld-recorders-buying-guide/>

https://service.shure.com/s/article/difference-between-a-dynamic-and-condenser-microphone?language=en_US

https://www.youtube.com/watch?v=CMlJ_jou4s

<https://www.learnlightandsound.com/blog/2015/06/29/zoom-h6-my-impressions-after-4-weeks>

<https://www.youtube.com/watch?v=Ty8YLqOmbV4>

- recommendations from acquaintances with experience in audio recording

